

Requirements Capture

REM Sleep Monitor II

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Introduction:

The objective of this senior design project is to continue and improve upon the REM Sleep Monitor previously developed by another senior design team. The monitor was built as a single channel EEG/EOG monitoring device. The goal of the monitor was to detect REM sleep and then it would communicate this to the user. The objective for part two of this senior design project is to improve the hardware and software to detect REM sleep. Also, complete testing on humans to better understand the physiological phenomenon of dreaming. This device would allow one to experiment with ludic dreaming, along with monitor dream states. The idea would be to send a signal to the user while they are dreaming during REM sleep or after REM to help them make sense of the dream experience. If testing proves successful, an application could be to conduct research that could help victims of Post-Traumatic Stress Disorder. The intent is for the design to be available to the public so they can recreate the monitor at home. Therefore, the goal is to make the design cost effective and easily reproducible.

Requirements/Demands:

1. Able to be tested
2. Effectively detect REM sleep
3. Send signal to user during REM, aiming to produce lucid dream
4. Transmit information via Bluetooth to computer to be stored
5. Battery operated
6. Compact and non-invasive
7. Meet AASM standards

Objectives:

- Ensure final design is testable
- Improve current hardware to be more efficient
- Improve current software to include an algorithm to analyze REM sleep signals
- Include configurations such as:
 - Alerting the user while dreaming
 - Wake the user after during REM sleep or when REM is complete
- Improve the device headband for comfort of test subject
- Minimize cost
- Connect device to person with only wires

Constraints:

- Get permission from IRB for explicit review
- Device must last at least four hours on battery operation
- Balancing cost and size
 - We will only be able to minimize size (to comply with being non-invasive) to a point while staying within our budget

Functions:

- Device will be able to pick up signals that denote when the user is in the REM sleep stage.
- It will alert the user that they are currently dreaming, along with wake the user during or after the REM cycle is completed
- The device will send data signals via Bluetooth to computer to be stored

Summary:

For this senior design project, we will continue the REM Sleep Monitor from the previous semester. We will improve the functionality of the hardware and software. Once the device is finalized, the next step would be to conduct testing on human subjects with the REM Sleep Monitor. Our objective is to create a more comfortable and compact monitor that will detect the REM sleep stage and alert the user while adhering to our constraints. After we have accomplished the objective, we plan to explore lucid dreaming and monitor sleep states. Finally, we will make the design available to the public.

This document describes all project requirements set forth by the advisor. Grading will be performed at the end of the semester according to the level at which these requirements are met.